PATENT APPLICATION

RESPONSE UNDER 37 CFR §1.116
EXPEDITED PROCEDURE
TECHNOLOGY CENTER ART UNIT 1795

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Takeshi TAKAHASHI et al. Group Art Unit: 1795

Application No.: 10/806,206 Examiner: R. HODGE

Filed: March 23, 2004 Docket No.: 119201

For: POSITIVE ELECTRODE ACTIVE MATERIAL FOR NONAQUEOUS ELECTROLYTE SECONDARY BATTERY AND NONAQUEOUS ELECTROLYTE SECONDARY BATTERY

REQUEST FOR RECONSIDERATION AFTER FINAL REJECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the March 18, 2009 Office Action, reconsideration of the rejection is respectfully requested in light of the following remarks.

Claims 2 and 17 are pending in this application.

I. Rejection Under 35 U.S.C. §103(a)

The Office Action rejects claims 2 and 17 under 35 U.S.C. §103(a) as having been obvious over the combination of JP 04-319260 to Watanabe et al. ("Watanabe") and JP 09-147916 to Inoue et al. ("Inoue"). Applicants respectfully traverse the rejection.

Claim 2 is directed to a positive electrode active material wherein "an existence ratio of zirconium and magnesium is respectively 20% or more on a surface of the lithium cobaltate, and at least part of the zirconium on said surface is present as lithium zirconate and at least part of the magnesium on said surface is present as magnesium oxide." The

combination of Watanabe and Inoue does not disclose and would not have rendered obvious the claimed positive electrode active material for at least the following reasons.

Watanabe discloses a positive electrode active material formed of $LiCoO_2$, or a composite oxide thereof in which cobalt is partly substituted with another transition metal, to which zirconium is added to improve the cycle properties and high temperature storage properties of a nonaqueous electrolyte secondary battery. See Watanabe at abstract; see also specification at page 2, lines 13-17.

Watanabe does not disclose both zirconium and magnesium on the surface of a lithium-transition metal composite oxide, let alone an existence ratio of zirconium and magnesium that is respectively 20% or more. Watanabe further does not disclose that "at least part of the zirconium on said surface is present as lithium zirconate and at least part of the magnesium on said surface is present as magnesium oxide." See Watanabe at abstract; see also specification at page 2, lines 13-17; and Office Action at page 3 ("Watanabe does not teach magnesium oxide on the surface of the lithium cobaltate.").

Watanabe discloses that other known additives, i.e.--nickel, iron, aluminum, tin, and indium--do not act to stabilize the surface of $LiCoO_2$ (or a composite oxide thereof). See Watanabe at paragraphs [0020] and [0021]. Watanabe discloses that zirconium--and not any other additive--does not cause voltage depression and exhibits stabilizing action. Id. Thus, no reason or rationale existed prior to Applicants' disclosure that would have led an ordinarily skilled artisan to modify the positive electrode active material of Watanabe to include any other additive to improve cycle and high temperature storage properties because Watanabe teaches that only one additive--zirconium--out of numerous other additives, improves such properties.

Additionally, Inoue fails to cure the deficiencies of Watanabe. Inoue discloses providing a protecting layer to a positive electrode or negative electrode active material to

improve the productivity of a nonaqueous secondary battery in which the protecting layer is formed from solid particles, a water-soluble polymer, and conductive particles. See Inoue at abstract and paragraphs [0004]-[0014]. Inoue discloses that the conductive particles may be numerous oxides, including Al_2O_3, As_4O_6, B_2O_3, BaO, BeO, CaO, Li_2O, K_2O, Na_2O, In_2O_3, MgO, Sb_2O_5, SiO_2, SrO_2, and ZrO_2. See Inoue at paragraph [0008]. Inoue also discloses that a surface of a positive or negative electrode active material can be coated with a metal oxide having a high electron conductivity, such as PbO_2, Fe_2O_3, SnO_2, In_2O_3, ZnO, and PbO, in an amount of 0.1 to 10% by weight of the of the electrode active material. See Inoue at paragraphs [0034] and [0036]. Regarding a positive electrode active material, Inoue discloses that it can be a lithium-transition metal-containing oxide in which numerous other metals, such as elements in the IA group and IIA group of the periodic table, may be present. See Inoue at paragraph [0035].

In view of the numerous oxides (and metals) disclosed by Inoue, it would not have been obvious to an ordinarily skilled artisan to specifically select MgO out of the numerous other options disclosed by Inoue to modify Watanabe to arrive at the claimed positive electrode active material because Inoue and Watanabe provide no reason or rationale to do so and the Office Action fails to set forth any reason or rationale to specifically select MgO. See MPEP §2143.

Additionally, neither Watanabe nor Inoue discloses anything regarding the ratio of zirconium and magnesium existing on the surface of lithium cobaltate, let alone anything regarding an existence ratio of zirconium and magnesium that is respectively 20% or more. The Office Action asserts that an ordinarily skilled artisan would have provided zirconium and magnesium in such an existence ratio "in order to reduce friction force among the active materials thereby increasing the flowability of the active materials so that the positive electrode film has a higher density thus increasing the charge/discharge characteristics of the

battery and also increasing the capacity of the battery." However, the Office Action provides no factual underpinnings for why an ordinary skilled artisan would have concluded that the claimed existence ratio would (1) reduce friction, (2) increase flowability, (3) result in denser positive electrode, (4) increase the charge/discharge characteristics, and (5) increase the capacity of the battery. Without providing any factual underpinnings, such as a teaching in the art that existence ratios are known to effect properties (1)-(5), Applicants can only presume that the Office Action's conclusion of obviousness is based upon improper hindsight reasoning, i.e.--based upon knowledge gleaned only from Applicants' disclosure. See MPEP §2133 and §2145(X)(A); see also specification at page 23, line 6 to page 25, line 9.

The Office Action further asserts that it "would have been obvious to optimize the 'existence ratio' of zirconium and magnesium respectively on the surface of the lithium-transition metal oxide of Watanabe as modified by Inoue since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results." See Office Action at page 4. However, "[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." See MPEP §2144.05(II)(B). As discussed above, the Office Action provides no factual basis to establish that an existence ratio is a result-effective variable subject to routine optimization.

Additionally, the combination of zirconium and magnesium in the claimed existence ratio provides unexpectedly improved results, which is indicative of non-obviousness. See MPEP §2145. The combination of zirconium and magnesium in the claimed existence ratio provides improved cycle characteristics and improved high rate characteristics from the presence of the zirconium compound, and improved thermal stability without deteriorating the cycle characteristics and high rate characteristics at high charging potentials from the

magnesium compound. See specification at page 32, line 20 to page 33, line 5. Further, the presence of zirconium and magnesium reduces interface resistance and improves power characteristics at high charging potentials without deteriorating the cycle characteristics and high rate characteristics at high charging potentials. See specification at page 33, lines 5-10.

For at least these reasons, the combination of Watanabe and Inoue would not have rendered obvious claim 2. Claim 17 depends from claim 2 and, thus, also would not have been rendered obvious by the combination of Watanabe and Inoue for at least the same reasons. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of this application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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